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Effect of addition *pliek U* in feed on histomorphometric of small intestine villi of broiler

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Abstract. The aims of this research was to find the effect of *pliek u* on the morphometric of small intestine villi of broiler. This research was conducted at teaching farm and Pathology Laboratory, Veterinary Medicine Faculty, Syiah Kuala University, on June to November 2011. *Pliek u* was collected from home industry in Jangka village, Bireuen. *Pliek u* added in feed with concentration of 0.5%, 1%, dan 2%, that was given every day for 28 days. Complete Randomized Design (CRD) was used in this research with four treatments K_0 (control), K_1 (0.5% *pliek u*), K_2(1% *pliek u*), and K_3(2% *pliek u*), each treatment group contain three broiler. The results showed that the concentration of addition *pliek u* in feed had no effect to histomorphometric of small intestine villi of broiler.
Keywords: *pliek u*, broiler, histomorphometric.

Introduction

Fermented food products can be used as an alternative feed additive for being able to improve the quality of feed ingredients, both from the aspect of nutrition and digestibility and to increase the shelf life of food. This product also has a higher nutrition value than the original product (Winarno and Fardiaz, 1980). Fermented food products that have been studied as an alternative feed additive is *dedak* (Hardini, 2010), *oncom ampas tahu* (Mahfuz, 2006), cocoa fruit peel (Nuraini and Mahata, 2009), and onggok (Supriyanti, 2003). One of alleged local fermented foods may also function as an alternative feed additive is pliek u.

Pliek u is one of the traditional Acehnese food, made from fermented coconut. *Pliek u* can also be used as alternative feed additive for poultry (Nurliana, 2008). According Nurliana *et al*. (2010), pliek u ethanol extract could inhibit the growth of bacteria and fungi as well as non-toxic. Beside that in the pliek u also contained Lactobacillus (Sulasmi *et al*., 2002), that have a role as a probiotic (Nuraida, 2008), which have a function in increasing the number of epithelial cells in intestinal villi, the absorption of food, and the performance of the efficient use of ration (wizna *et al*., 2008).

Pliek u is also contain free fatty acids of 0.52% (Sulisma, 2010), which may contribute in stimulating the multiplication of intestinal epithelial cells (Harimurti and Rahayu, 2009). Proliferation of intestinal epithelial cell will increases the surface area of the small intestine villi. The more surface area of the small intestine villi, the greater the chance of absorption of food in the gastrointestinal tract (Balqis, 2007).

Based on the above problem it is necessary to make a research in order to determine the function of pliek u as an alternative feed additive to improve the absorption ability in the digestive tract by observing the histomorphometric of small intestine villi of broiler.

Materials and Methods

Preparation of aminal experiments

This study uses 12 Cobb strain broiler chickens aged 1 day 707 CP that are kept in cages yearling length 1 m, width 1 m, and height 50 cm. after 14 days of broiler is transferred into a single cage measures 50 cm long, 50 cm width, and height 50 cm. Treatment of animal experiments carried out at home to the Faculty of Veterinary Medicine Syiah Kuala University in Banda Aceh.

Preparation of pliek u as feed additive in fed broiler

Commercial feed was given as broiler starter type (IF-511) for 21 days and the type of finisher (IF-512) from day 22 until day 35. Pliek u was obtained from the home industrial production, Matang-Bireuen, Aceh province. Twelve broilers were divided into four treatment groups. First treatment as a control, chickens were fed commercial feed without containing of pliek u. Treatment II, III and IV, chickens were fed with addition of 0.5, 1 and 2% pliek u in

feed, respectively. Feeding was done every morning and evening. Chickens were dekapited after 35 days of treatments.

Procedure of haematoxylin eosin staining and measure of histomorphometric

Immediately after broiler were dekapited, the small intestine including duodenum, yeyunum, and ileum was cut and immersed in neutral buffered formalin (NBF) 10% for 4 days. Each piece of sample is cut along 1 cm, then dehydrated using an alcohol solution and by solution-rise next clearing with xilol, infiltration with paraffin infiltration and planting by using paraffin blocks. Sliced tissue thickness of 5 µm using a microtome and placed on a glass object with the help of adhesive albumin and stained with haematoxylin eosin staining (H&E). Height, width of basal and apical villi width duodenum, and ileum yeyunum calculated using a microscope (Olympus) at 4 times the objective magnification and measured the histomorphometric villi with micrometer eyepiece of the 5 field of view for each preparation. illustration of the villi which are measured in Figure 1. Analysis of data Tested with analysis of treatment effect range, if they express the influence real Duncan followed with different test. Data presented as mean ± standard deviation (SD). Statistical calculations using the SPSS 15 for Windows

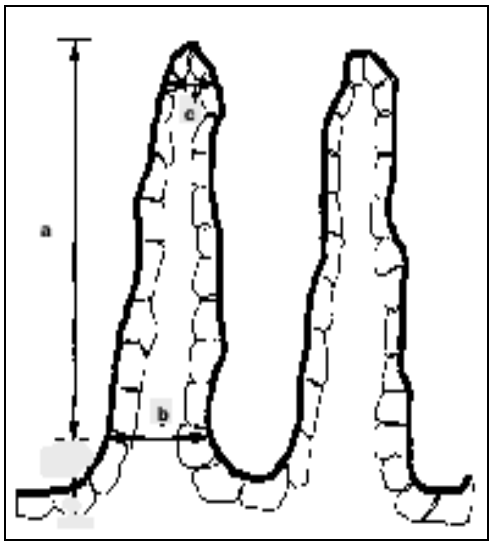

Figure 1. The intestine villi that measured include, height (a), width of basa (b) and apical villi (c) (Sugito et al., 2007)

Results and Discussion

The small intestine morphometric including measuring height, basal width, and the width of the apical the small intestine villi of broiler was given ransume with adding *pliek u* at some concentrations. The results of measurements of height, basal width, and the apical width of The small intestine villi of broiler can be seen in Table 1. Based on the analysis of variance showed that the addition of pliek u with doses 0, 0.5, 1, and 2% in the ration did not show significant differences (P> 0.05) for height, width of basal and apical villi duodenum, yeyunum and ileum, but the height of duodenuml, yeyunum, and ileum villi tended to increase in the addition of pliek u than the control group. Similarly, the P3 group increased basal and apical width of duodenum, yeyunum, and ileum villi. Histological of intestinal villi of broiler can be seen in Figure 2.

The increase of height villi in this study was associated with an increase in the number of surrounding epithelial cells (Fan *et al*., 1997) and associated with active mitosis intestinum epithelial cell (Samanya and Yamaguchi, 2002) that may be stimulated by Lactobacillus contained in *pliek u* (Sulasmi *et al*., 2002). Harimurti and Rahayu (2009) reported the concentration of Lactobacillus murinus 10^8 bacterial cells per milliliter may affect of intestinal villi morphometric significantly. Lactobacillus may affect morphometric intestinal villi associated with short-chain fatty acids (SCFA) produced by bacteria in the gut (Ichikawa in Ahmad, 2006) that play a role in stimulating the multiplication of intestinal epithelial cells

(Gunal *et al*., 2006), as a source energy for intestinal epithelial cells and epithelial membrane phospholipid components (Hammer *et al*., 2008). It can be associated with increased intestinal villous surface area for nutrient absorption (Mile *et al*., 2006). Instead intestine villi are shortened associated with the decreased absorption of nutrients, secretion of intestinal glands and performan (Xu *et al*., 2003). It is also stated by Awad *et al*. (2008) that an increase in villous height in the jejunum of broiler associated with improved digestion and absorption because of widespread the absorption area. Giving *pliek u* with some concentration has not seen significant effect may be due to the amount contained the Lactobacillus in *pliek u* is not optimal to affect morphometric of intestinal villi.

Pliek u is a product fermentation of coconut is traditionally used as seasoning, chili, and chicken feed (Nurliana, 2009). As a product of fermentation, *pliek u* also contains a variety of compounds as a result of fermentation processes such as organic acids, bacteriocins, alcohols, fatty acids and enzymes that are used by the product being damaged by destructive microbes.

Table 1. Histological profile of height, basal width and apical villi of duodenum, yeyunum, and ileum of broiler (μ m ± SD)

Intestine (μm)	Adding *pliek u*			
	P0	P1	P2	P3
Duodenum				
Height of villi	888.9±135.9	988.5±17.7	791.2±164.5	1138.3±111.6
Width of bassal	85.1±31.6	97.6±18.6	92.3±16.8	95.7±11.4
Width of apical	45.9±14.5	55±13.6	50.1±6.4	73.2±3.5
Yeyunum				
Height of villi	761.9±216.4	874.7±122.9	651.2±106.1	905.6±120.9
Width of bassal	92.5±21.1	74.9±3.8	76.8±7.1	85.9±5.7
Width of apical	58.9±13.2	48.8±2.4	45.3±1.7	70.1±2.8
Ileum				
Height of villi	433.9±36.6	550.4±35.1	444±70.1	728±134.6
Width of bassal	70.9±5.6	70.4±4.4	68.3±5.3	93.1±20.6
Width of apical	54.9±10.6	52.3±6.5	34.9±2.4	64.5±22.4

Description: P0 (commercial feed without addition *pliek u*), P1 (commercial feed with addition *pliek u* 0.5% per kilograms of feed), P2 (commercial feed with addition *pliek u* 1% per kilograms of feed), P3 (commercial feed with addition *pliek u* 2% per kilograms of feed)

Conclusions

Based on the results of this study concluded that the addition of *pliek u* with a concentration of 0.5, 1, and 2% per kilograms ration does not increase the height and width of intestinal villi of broiler. Further research needs to determine the amount of active compounds and microbes in *pliek u* that can play a role in increasing height and width of small intestine villi.

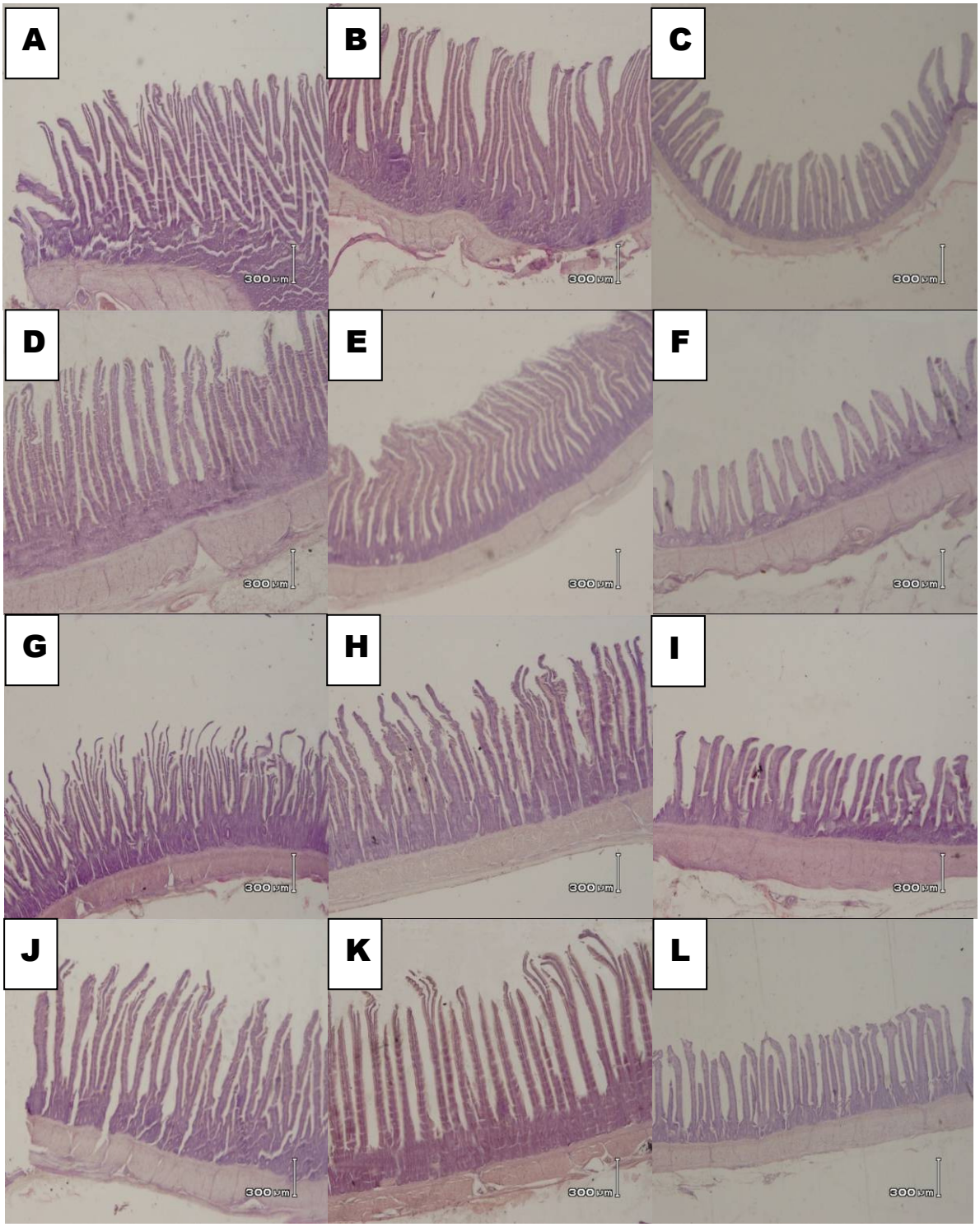

Figure 2. Histological intestinal villi of broiler chickens by staining HE (magnification 40x) (source: private collection). Information: A(duodenum P0); B(yeyunum P0); C(ileum P0); D(duodenum P1); E(yeyunum P1); F(ileum P1); G(duodenum P2); H(yeyunum P2); I(ileum P2); J(duodenum P3); K(yeyunum P3); L(ileum P3).

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